POSTNIKOV, V.I.

POSTNIKOV, V.I.

Using radioactive isotopes for testing the quality of parts.
Politekh. obuch. no.2:51-58 F '58. (MIRA 11:1)
(Machinery--Testing) (Isotopes--Industrial applications)

POSTNIKOV, V.I., inzh.; LETENKO, V.A., kand. tekhn. nauk

Economic efficiency of gamma-ray inspection. Mashinostroitel' no.10:37-38 O '59. (MIRA 13:2)
(Radioisotopes--Industrial applications)

POSTNIKOV, V.I., kand.tekhn.nauk

Isotopes and economics. Nauka i zhizn' 27 no.8:2 Ag '60.
(MIRA 13:8)
(Radioisotopes--Industrial applications)

SOV/137-59-3-5935

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 3, p 141 (USSR)

AUTHORS: Avilov, V. P., Postnikov, V. M.

TITLE: Electric Welding of Storage-battery Vessels on the "MShP-150" Machine (Elektrosvarka akkumulyatornykh sosudov na mashine "MShP-150")

PERIODICAL: Byul. tekhn. inform. Sovnarkhoz Kurskogo ekon. adm. r-na, 1958, Nr 3, pp 13-14

ABSTRACT: Use of resistance seam welding of storage-battery vessels made of pickled steel 1-1.25 mm thick instead of manual arc or automatic gas welding has reduced the percentage of rejects and, hence, has increased output by a factor of 2 to 3. The welding was done on a stock MShP-150 machine.

A. P.

Card 1/1

STAROSTENKO, G.A.; POSTNIKOV, V.O.; GREVTSOVA, M.F.

Electrohydraulic safety device attached to the draw works of a LT-11KM tractor hoist. Neftepром. delo no.12:25-29 '63. (MIRA 17:4)

1. Krasnodarskiy filial Vsesoyuznogo nauchno-issledovatel'skogo i proyektno-konstruktorskogo instituta kompleksnoy avtomatizatsii neftyanoy i gazovoy promyshlennosti.

POSTNIKOV, V. P., Cand Tech Sci -- "Heat transmission in ~~maritime~~ marine contact gas refrigerators ~~when the~~ at high speeds of gas movement ~~are increased.~~" [Len], 1961. (Len Shipbldg Inst) (KL, 8-61, 247)

POSTNIKOV, V.P.

Heat exchange in direct-flow, hollow-scrubbers with spraying of the liquid by a gas stream moving at high velocity. Zhur. prikl. khim. 33 no.8:1801-1808 Ag '60. (MIRA 13:9)
(Heat--Transmission) (Scrubber (Chemical technology))

TIMOSHENKO, V.V.; MARTYNISHKIN, A.M.; TSUKANOV, V.P.; GANGO, Ya.V.; SHIKOV, I.P.; NIKONOV, A.V.; POSTNIKOV, V.P.; KOROLEV, G.D.; ANTAMONOV, A.M.; TSVIKOV, S.N.; KABLUKOVSKIY, A.F.; MAKHOV, A.Zh.; KOTIKOV, A.Kh.; ZNAMENSKIY, B.A.; ZUYEV, T.I.; IOZDNYAKOV, L.P.; BALASHOV, S.A.; YERMOKHIN, I.P.

New design of electrode holders for electric-arc smelting furnaces. (MIRA 15:1)
Prom. energ. 15 no.8:13-14 Ag '60.
(Electric furnaces)

10.7000,5.1230

77512
SOV/80-33-1-21/49

AUTHOR: Postnikov, V. P.

TITLE: Heat Exchange at High Gas Velocities in Packed Scrubbers

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 1, pp 117-127 (USSR)

ABSTRACT: The flow of gases and the heat exchange in scrubbers filled with earthenware Raschig rings (15 x 15 x 2) and steel rings (25 x 25 x 0.8 and 35 x 35 x 1) was investigated at gas velocities of 3.5 to 8 m/sec and water flow rate of 24 to 116 $m^3/m^2 \cdot hr$. Two parallel flow scrubbers of different diameters (160 and 500 mm) and internal combustion engine gases were used in the experiments. It was established that the thickness of the liquid film in parallel flow scrubbers decreased considerably as a result of the combined effect of the gas velocity and gravity; the heat exchange rate increased with the gas velocity much more than in counterflow scrubbers. The study of the experimental data allowed for establishing the

Card 1/5

following criterion of similarity:

$$K_i = f(Re_g, Re_l, Pr_g)$$

where $K_i = K \cdot d_e /$ is the Kirpichev criterion; $Re_g =$ $= w \cdot d_e /$ $_g$ is Reynolds number for the gas; $Re_l =$ $H \cdot d_e / 3600 \cdot$ $_l$ is Reynolds number for the liquid; $Pr =$ $_g / a$ is Prandtl number for the gas; d_e is the equivalent diameter of the packing (in meters); $\cdot\cdot$ is the thermal conductivity of the gas (in Cal/m·hr·degree); w is the gas velocity in the effective cross section of the Raschig rings; $_g$ is the kinematic viscosity of the gas (in m^2/sec); $_l$ is the kinematic viscosity of the liquid (in m^2/sec); H is the density if irrigation (in $m^3/m^2 \cdot hr$); $a =$ $/c \cdot$ is the thermal diffusion corefficient (in m^2/hr); is the specific gravity

of the gas (in kg/m^3); and c is the heat capacity of the vapor/gas mixture (in Cal/kg·degree). The above relationship can be expressed by the exponential function

$$K_i = c \cdot Re_g^{m} \cdot Re_l^{n} \cdot Pr^{k}$$

The plots of similarity of criteria in logarithmic coordinates for both scrubbers with various heights of packing gave straight lines which could be expressed by the equations

$$K_i = 5.65 \cdot 10^{-3} \, Re_g \cdot Re_l^{0.45} \cdot Pr^{0.33}$$

$$K_i = 3.7 \cdot 10^{-3} \, Re_g \cdot Re_l^{0.45} \cdot Pr^{0.33}$$

The exponents for Reynolds numbers were obtained from the experimental data, those for Prandtl numbers from data contained in other studies. Similar equations were obtained for various sizes of Raschig rings and various

packing heights; the only difference between them was the numerical coefficient which evidently characterized the geometrical parameters of the scrubbers. After having introduced the criterion of geometrical similarity h/d_e (where h is the height of the packing; d_e is its equivalent diameter), the following general equation was obtained for parallel flow-packed scrubbers:

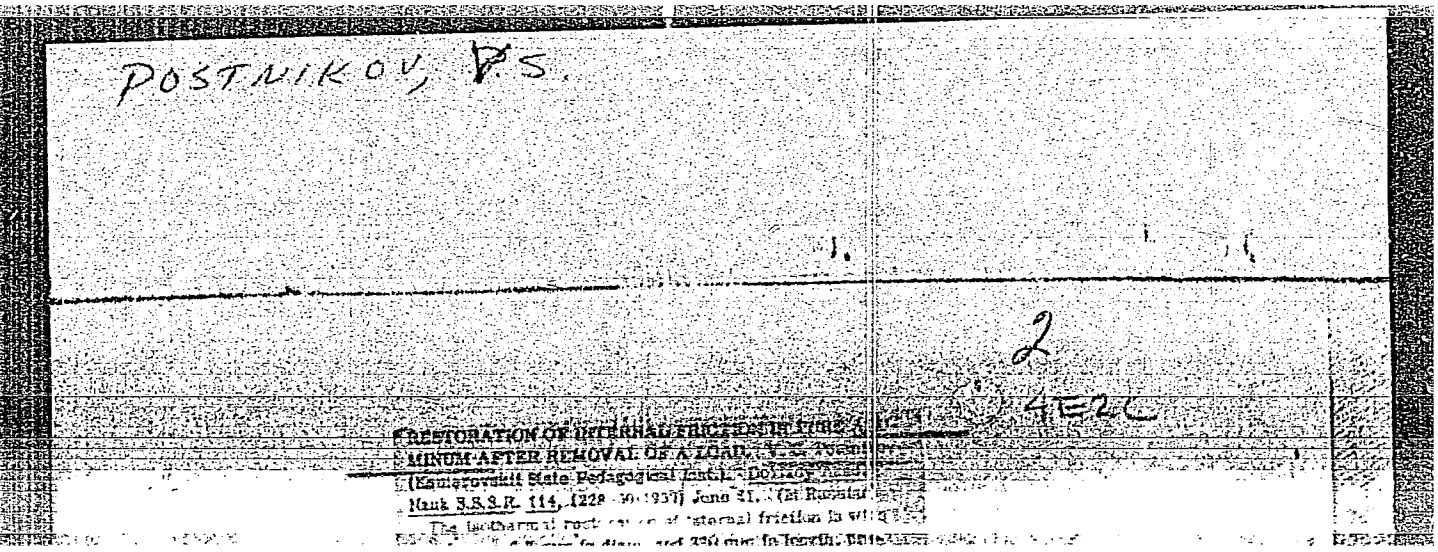
$$K_i = 50 \cdot 10^{-3} \, Re_g \cdot Re_l^{0.45} \cdot Pr^{0.33} \cdot \left(\frac{h}{d_e}\right)^{-0.8}$$

The divergence between the experimental and calculated data did not exceed 10 to 15%. Based on the above study, a general equation was also obtained for calculation of the heat-exchange values in counterflow/packed scrubbers:

$$K_i = 2.57 \cdot 10^{-3} \, Re_g^{0.76} \cdot Re^{0.76} \cdot \left(\frac{h}{d_e}\right)^{-0.6}$$

The above equation differs in the values of the exponents from the equation established by B. A. Chertkov (ZhPKh, 1958, Vol 31, p 8). There are 6 figures; 2 tables; and 4 Soviet references.

SUBMITTED: April 9, 1959


POSTNIKOV, P.S.

2

4=2C

RESTORATION OF INTERNAL FRICTION TIME [illegible]
MINUM AFTER REMOVAL OF A LOAD [illegible]
(Kamyenyetskiy State Pedagogical Instit., Dokl. Akad. Nauk S.S.S.R. 114, (229-30) 1937) June 21. (In Russian)
The logarithmic rest[illegible] of internal friction in wi[illegible]

POSTNIKOV, V. S.

Relaxation effects in metals and alloys subjected to deformation, V. S. Postnikov. *Uspekhi Fiz. Nauk* 33, (87-108(1054)—A survey with 32 references. S. P. [illegible]

POSTNIKOV, V. S.

"Colloidal Precipitation Reactions of the Blood During Certain Beef Cattle Diseases." Cand Vet Sci, Leningrad Veterinary Inst, Leningrad, 1954. (RZhBiolKhim, No 2, Jan 55)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (12)
SO: Sum. No. 556, 24 Jun 55

S/137/62/000/012/053/085
A006/A101

AUTHORS: Postnikov, V. S., Zolotukhin, I. V., Gorshkov, G. A.

TITLE: Investigating the mechanical and thermal metal fatigue by the internal friction method

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 12, 1962, 103 - 104, abstract 121637 (In collection: "Tsiklich. prochnost' metallov", Moscow, AN SSSR, 1962, 218 - 226)

TEXT: A description is given of using the internal friction method (low-frequency method of low-amplitude torsion oscillations) to study mechanical and thermal fatigue. The frequency of free oscillations of a 100-mm long specimen, of 0.7 - 1 mm section, was about 1 cps. The logarithmic decrement of damping divided by π, was considered as a measure of internal friction. To study mechanical fatigue, preliminary cyclic deformation of a specimen fixed in a relaxator, was produced with the use of a special device controlling the inertia band of the relaxator, which made it possible to twist the specimen through angles from 0° to 60°. (The angle of twist of the specimen during measurements

Card 1/2

MAL'TSEVA, G.K.; POSTNIKOV, V.S.

Effect of heat treatment on temperature relation characteristics of internal friction in beryllium bronze. Izv. vys. ucheb. zav.; chern. met. 5 no.7:146-150 '62. (MIRA 15:8)

1. Voronezhskiy tekhnologicheskiy institut.
(Beryllium bronze--Heat treatment) (Internal friction)

POSTNIKOV, V.S.

Internal friction and modulus of shear of pure copper and beryllium bronze. V. S. Postnikov (*Dokl. Akad. Nauk. SSSR*, 1953, 9, 79–82).—A sharp max. in the internal friction Q of pure Cu at 230° indicates that flow sets in here along grain boundaries, with a heat of activation of 52·4 ± 4·6 kg.-cal./mole. For Be bronze (1·9% Be) there is no such max., but Q decreases at constant temp. between 200 and 300°, which can be explained by separation of a γ-phase through breakdown of a supersaturated solid solution of Be in Cu, for which ΔH is calculated from the results to be 16 ± 3 kg.-cal./mole, which is < the value obtained by Guy *et al.* (*Metals Technol.*, 1948, 15, T.P.2341) by other methods.

R. C. MURRAY.

POSTNIKOV, V. S.

Metallurgical Abst.
Vol. 21
May 1954
Properties of Metals

*Internal Friction and Shear Modulus of Pure Copper and Beryllium Bronze. V. S. Postnikov (*Doklady Akad. Nauk S.S.S.R.*, 1953, 91, (1), 79–82).—[In Russian]. The internal friction and shear modulus change with temp. and heating time in pure Cu and Cu–1·9% Be alloy. The max. occurring at 224° C. in internal friction in pure Cu due to grain-boundary relaxation is associated with a heat of activation $H = 52{,}400 \pm 4600$ cal./mole. Ageing of Cu–Be alloy in the range 260°–310° C. is accompanied by pptn. of γ phase and the change in internal friction with time at const. temp. is used to calculate the heat of activation for sepn. of Be from solid soln. as 16,000 ± 300 cal./mole. 6 ref. (Translated by the U.S. National Science Foundation, Washington (NSF-tr-86)).—D. M. P.

Moscow Steel. Inst. im. Stalin

Postnikov, V. S.

USSR/Physics-Relaxation phenomena of metals FD-1223

Card 1/1 Pub. 153-7/22

Author : Postnikov, V. S.

Title : Temperature dependence of internal friction of aluminum and copper

Periodical : Zhur. tekh. fiz., 24, 1599-1608, Sep 1954

Abstract : The results of studies of temperature dependence of "internal friction" i.e. the ability of the alloy to convert into heat the internal elastic oscillations due to relaxation, are described. An attempt is made to explain the phenomena by the theory of properties of relaxation of solid bodies. Indebted to Dr. B. N. Finkelshteyn. Twenty-two references including four foreign.

Institution :

Submitted : December 16, 1953

POSTNIKOV, V. S.

USSR/Physics - Relaxation of metals

Card : 1/1 Pub. 118 - 4/15

Authors : Postnikov, V. S.

Title : Relaxation phenomena in metals and alloys subjected to deformation

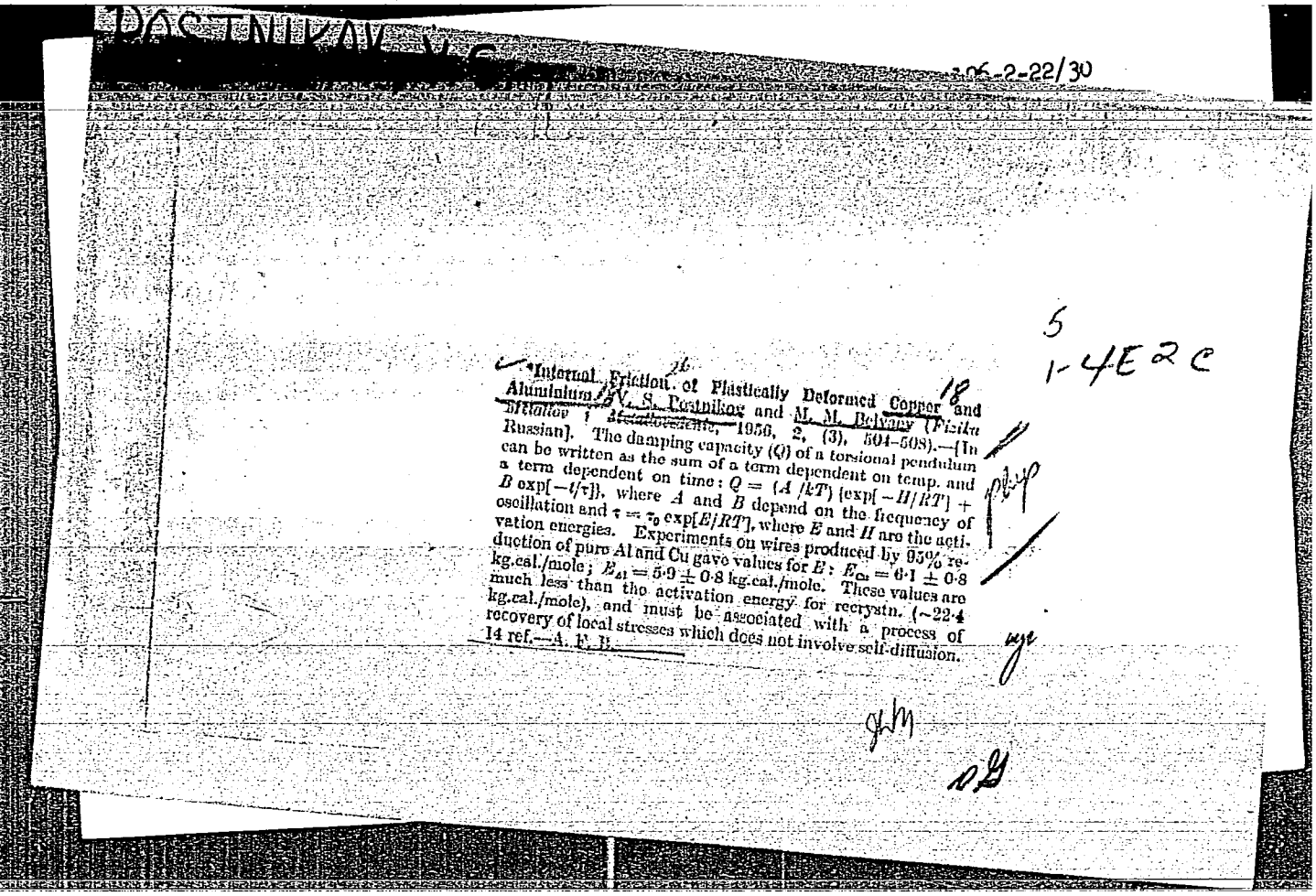
Periodical : Usp. fiz. nauk 53/1, 87 - 108, May 1954

Abstract : Phenomena (of residual elasticity and creep) observed during experiments with metals and alloys, subjected to deformation, have been analyzed for the purpose of establishing a theoretical bases for the observed phenomena. Although, generalization of Hook's law and the method of mechanical and electrical analogies lead to a formal theory; the theory, however, did not give a satisfactory physical picture of the phenomena studied. Thirty two references. Graphs.

Institution : ...

Submitted : ...

Translation B-82533, 2 Feb 55



DA-2-22/30

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1-4E2c

26 18

Internal Friction of Plastically Deformed Copper and Aluminium. V. S. Postnikov and M. M. Belyaev (Fizika Metallov i Metallovedenie, 1956, 2, (3), 504–508).—[In Russian]. The damping capacity (Q) of a torsional pendulum can be written as the sum of a term dependent on temp. and a term dependent on time: $Q = (A/kT)\{\exp[-H/RT] + B\exp[-t/\tau]\}$, where A and B depend on the frequency of oscillation and $\tau = \tau_0 \exp[E/RT]$, where E and H are the activation energies. Experiments on wires produced by 95% reduction of pure Al and Cu gave values for E: $E_{Al} = 5{\cdot}9 \pm 0{\cdot}8$ kg.cal./mole; $E_{Cu} = 6{\cdot}1 \pm 0{\cdot}8$ kg.cal./mole. These values are much less than the activation energy for recrystn. (~22·4 kg.cal./mole), and must be associated with a process of recovery of local stresses which does not involve self-diffusion. 14 ref.—A. E. B.

at various temperatures. The degree of purity and the degree of preliminary deformation (reduction) of each of the tested metals are entered in a table on p.345. The results obtained by the author of this paper are plotted in the graphs Figs. 1 to 4. Fig.1: for Co, Ti, Mo and W; Fig.2: for Al, Cu, Ni, Fe; Fig.3: for pure Ni, solid solution of C in Ni, with 0.04% C, 0.07% C, 0.21% C; Fig.4: for pure Ni, solid solution of Cr and Ni with 0.72% Ni and 1.19% Ni and for nichroma Figs. 5 and 6 give the results obtained by other authors for Sn, Pb, Mg, Au, Ag and Pt. The given experimental data of the temperature dependence of internal friction of Ti, Ni, Fe, Mo and W and also the results obtained by other authors for Sn, Pb, Mg, Ag, Au and Pt confirm satisfactorily the general conclusions of the author, expressed in an earlier paper (13). According to these, internal friction is due to various types of relaxation phenomena proceeding in metals and alloys under the influence of stress fields produced by external cyclic load. In accordance with this relaxation theory, it is assumed that transition of the system (metal - alloy) from the metastable into the stable state in accordance with given conditions is characterised by one or

20-114-6-25/54

AUTHORS: Samoylova, A. Ya., Postnikov, V. S.

TITLE: The Rest_oration of Internal Friction in Pure Aluminum After Relief of Load (Vosstanovleniye vnutrennogo treniya chistogo alyuminiya posle snyatiya nagruzki)

PERIODICAL: Doklady Akademii Nauk SSSR,1957,Vol.114,Nr 6,pp.1228-1230(USSR)

ABSTRACT: The present paper studies the rest_oration of the internal friction in aluminum wires of 0,7 mm diameter and 320 mm length. These wires of pure aluminum (~99,98 % Al) had previously been stretched. The investigation was performed by the method of rotary oscillations with small frequency and small amplitude. All samples had previously been annealed for two hours in the same apparatus in a vacuum of $\sim 10^{-3}$ mm mercury column at 450°C. These samples have fairly homogeneous grains with a mean diameter of 0,03 cm. The stretching of the wires was performed by loading with various weights. This load acted during one hour and immediately after relief of the load the measurements of the internal friction were begun. The measurement results are illustrated by two diagrams. At room temperature the internal strain decreases exponentially, -

Card 1/2

SAMOYLOVA, A.Ya.; POSTNIKOV, V.S.

Recovery of internal friction in aluminum, silver, and platinum following stress relief. Fiz. met. i metalloved. 6 no.6:1081-1087 '58. (MIRA 12:1)

1.Kemerovskiy gosudarstvennyy pedagogicheskiy institut.
(Friction) (Metals--Testing)

POSTNIKOV, V.S.

Temperature dependence of the internal friction in pure metals and alloys. Usp. fiz. nauk 66 no.1:43-77 S '58. (MIRA 11:12)
(Friction) (Metals)

SOV/126-- -7-5-22/25

AUTHOR: Postnikov, V.S.

TITLE: Scattering of Energy in a Vibrating Sample at High Temperatures (Rasseyaniye energii koleblyushchimsya obraztsom pri vysokikh temperaturakh)

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 7, Nr 5, pp 777-781 (USSR)

ABSTRACT: Internal friction (Q^{-1}) of metals and alloys rises with temperature. The total internal friction is a sum of several components due to different relaxation effects independent of one another. For example, internal friction of a vibrating sample of aluminium, shown by an experimental curve 1 in Fig 1, can be regarded as due to three components (II, III and IV) represented by curves 2, 3 and 4 in Fig 1. The component II is due to viscous slip along the grain boundaries. The component III is due to thermal conductivity, interaction of elastic vibrations with thermal vibrations of the lattice, and interaction of thermal lattice vibrations with conduction electrons. The component IV is due to migrations of various lattice defects in the applied mechanical field; this component is obtained by subtracting components II and III from the experimental curve. The author considers only the

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Scattering of Energy in a Vibrating Sample at High Temperatures

component IV, known as the background. The lattice defects may be simple (impurity atoms, displaced atoms, vacant sites) or complex (dislocations of various types); the author considers only scattering of energy due to the motion of simple defects. The contribution to internal friction due to impurity atoms is independent of temperature and in the case of aluminium amounts to 0.2%. The energy necessary to displace an atom is greater than the energy of formation of a vacancy ("hole") and consequently the contribution of the motion of displaced atoms to internal friction may be neglected. It follows, therefore, that in consideration of migration of simple defects we need discuss only vacancy (hole) motion. Vacancies are produced during growth of a crystal and during thermal or mechanical treatment. The author discusses the mechanism of energy loss of a vibrating solid due to migration of vacancies (holes) and derives a theoretical formula given by Eq (9). For an aluminium sample in the form of a wire 300 mm long, 0.7 mm in diameter, executing free vibrations at 0.62 c/s (displacement amplitude of 10^{-4} cm), the formula of Eq (9) gives internal friction Q^{-1} in the form of Eq (10):

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Scattering of Energy in a Vibrating Sample at High Temperatures

$$Q_{II}^{-1} = \frac{1.1 \times 10^{11}}{T} e^{-\frac{33 \cdot 000}{RT}} \qquad (10)$$

The relationship of Eq (10) is plotted as the curve 5 in Fig 1. At high temperatures it agrees fairly satisfactorily with the curve 4, which represents a semi-empirical relationship (Eq 1)

$$Q_{I}^{-1}(T) = \frac{1.13 \times 10^{4}}{T} \exp -\frac{8900}{RT} \qquad (1)$$

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The large differences between the curves 4 and 5 at lower temperatures are due to great simplification in the theoretical derivation of Eq (9).

SOV/126- - -7-5-22/25

Scattering of Energy in a Vibrating Sample at High Temperatures

There are 2 figures and 21 references, 14 of which are Soviet, 6 English and 1 German.

ASSOCIATION: Kemerovskiy gosudarstvennyy pedagogicheskiy institut (Kemerovo State Pedagogical Institute)

SUBMITTED: January 17, 1958

Card 4/4

AUTHORS: Lebedev, R.S. and Postnikov, V.S. SOV/126-8-2-23/26

TITLE: Influence of Plastic Deformation on Internal Friction of Iron and Iron-nickel Alloy

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 2, pp 310 - 314 (USSR)

ABSTRACT: The authors describe a continuation of their work (Ref 1) on the influence of plastic deformation on internal friction of iron-base alloys. In the present work, they used their former method and conditions except for a higher heating rate (60 °C per minute); the error at high temperature has been reduced to about 1%. Results for electrolytic iron reduced by 8, 17, 30, 47, 70 and 92% and armco-iron + 4% Ni reduced by 20-80% are tabulated (for the Fe-Ni alloy) and shown in Figures 1-5. Some specimens were annealed at 825 °C for 1.5 hours. Figures 1-4 show internal friction and shear modulus as functions of temperature for different reductions. Figures 1 and 3 relate to iron and iron-nickel, respectively, without annealing; Figures 2 and 3, respectively,

Card1/3

Influence of Plastic Deformation on Internal Friction of Iron and Iron-nickel Alloy

with annealing. Internal-friction peak values are plotted against degree of reduction for the various tests in Figure 5. The internal-friction curve for iron-nickel has two maxima, while the iron-tungsten alloy (Ref 1) has only one. The first maximum disappears almost completely after high-temperature annealing but the second does not. The first is thus due mainly to previous deformation and, as confirmed by activation-energy values (table), is associated with recrystallization; the second maximum is associated with grain-boundary relaxation. The authors suggest that internal-friction values give some indication of high-temperature strength. As before (Ref 1), the activation energy of internal-friction recovery in isothermal soaking was found to be considerably less than that of diffusion or of recrystallization. Although this suggests that recovery is not diffusional, the authors consider that insufficient experimental data are available to discuss a dislocation mechanism (Refs 4-6).

SOV/126-8-2-23/26

Influence of Plastic Deformation on Internal Friction of Iron and Iron-nickel Alloy

There are 5 figures, 1 table and 6 references, of which 4 are Soviet, 1 English and 1 German.

ASSOCIATION: Kemerovskiy gosudarstvennyy pedagogicheskiy institut (Kemerovo State Pedagogical Institute)

SUBMITTED: March 6, 1959

Card 3/3

L 34483-65 EWT(m)/EPR/T/EWP(t)/EWP(b)/EWA(c) Ps-4 IJP(c) JD

ACCESSION NR: AP5002354 S/0126/64/018/006/0933/0935

AUTHOR: Zolotukhin, I. V.; Postnikov, V. S.

TITLE: Defects in aluminum monocrystals obtained by cyclic heat treatment

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 6, 1964, 933-935

TOPIC TAGS: aluminum, heat treatment, cyclic heat treatment, defect formation, aluminum monocrystal

ABSTRACT: Electropolished aluminum monocrystals of (110) and (111) orientation were subjected to cycled heat treatment (heated to 600C and cooled in 60 sec. in air to 160C) and examined microscopically. After 100 cycles the surfaces of loaded and unloaded samples were covered with $10^7/cm^2$ pinpoint defects. As the number of cycles increased the density of the defects decreased but their area increased; triangular defects were formed on the (111) crystals and rectangular and trapezoidal on the (110) facets. After 300 cycles thin streaks appeared in the areas with greatest defect accumulation on the (110) monocrystals. The defects grew gradually with continued thermal cycling to attain dimensions visible with an

Card 1/2

L 34483-65

ACCESSION NR: AP5002354

optical microscope. Annealing at 600C did not affect the formation or distribution of the defects. Orig. art. has: 1 table and 2 figures.

ASSOCIATION: Voronezhskiy politekhnicheskiy institut (Voronezh Polytechnical Institute)

SUBMITTED: 27Feb64 ENCL: 00 SUB CODE: MM, SS

NR REF SOV: 004 OTHER: 004

Card 2/2

L 32253-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b) IJP(c) JD

ACCESSION NR: AP5006333 S/0126/65/019/002/0268/0273

AUTHOR: Postnikov, V. S.; Ammer, S. A.; Belyayev, A. M.

TITLE: Internal friction of shear modulus, and strength of copper whiskers

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 2, 1965, 268-273

TOPIC TAGS: copper whisker, whisker internal friction, whisker shear modulus, whisker strength, temperature dependence

ABSTRACT: The temperature dependence of the internal friction and shear modulus of copper whiskers 6—10 mm long, 3—10 μ in diameter, and with a 23—150-μ^2 cross section has been investigated by means of a low-frequency torsion micropendulum in a vacuum of $2-5\cdot10^{-5}$ mm Hg at temperatures ranging from 20 to 800C. The room temperature tensile strength of the whiskers varied from 17 to 121 kg/mm^2 depending on the cross section. The internal friction was practically independent of temperature in the 20—400C range and was comparable in magnitude to that of ordinary copper single crystals, but sharply increased in the 600—650C range. A small peak was observed at 430C; 2-hr annealing at 650C had no effect on its magnitude or position, and its nature was not determined. The twin-whiskers had

Card 1/2

L 32253-65

ACCESSION NR: AP5006333

an appreciable peak at 530—580C, probably caused by the interface between two crystals. The shear modulus decreased quite sharply with increasing temperature. Orig. art. has: 5 figures and 1 table. [MS]

ASSOCIATION: Voronezhskiy politekhnicheskiy institut (Voronezh Polytechnic Institute)

SUBMITTED: 28Feb64 ENCL: 00 SUB CODE: SS, MM

NO REF SOV: 012 OTHER: 007 ATD PRESS: 3204

Card 2/2

POSTNIKOV, V.S.; ZOLOTUKHIN, I.V.

"Grain-boundary" peak of internal friction in metals. Dokl. AN SSSR 158 no.3:590-593 S '64. (MIRA 17:10)

1. Voronezhskiy politekhnicheskiy institut. Predstavleno akademikom G.V.Kurdyumovym.

L 23026-66 EWT(l)/EWT(m)/T/EWP(t) IJP(c) JD/HW/GG

ACC NR: AP6009662 SOURCE CODE: UR/0181/66/008/003/0792/0796

AUTHORS: Ammer, S. A.; Belikov, A. M.; Kosilov, A. T.; Postnikov, V. S.

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Features of the structure of copper-iron and copper-nickel filamentary crystals

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 792-796

TOPIC TAGS: fiber crystal, copper, hardness, crystal structure, x ray study, metallographic examination, single crystal, metal whisker

ABSTRACT: The main purpose of the investigation was to determine the reasons for the observed large microhardness of the transition layer of copper-iron whiskers, and to obtain other data on the fine structure of such whiskers. The whiskers were grown from mixtures of chloride salts of the corresponding metals in a hydrogen atmosphere by the method of T. S. Ke (Scientia sinica v. 10, 301, 1961). The

Card 1/2

L 23026-66

ACC NR: AP6009662

grown whiskers had a complicated structure, consisting of a single-crystal core-rod surrounded by a polycrystalline envelope, which was thicker at the base of the whisker and narrower at its tip. Some whisker tips had no envelope at all. X-ray structural analysis and metallography were used to investigate the structure. At envelope thickness up to 50 μ, the Debye rings of the x-ray rotation patterns showed a clearly pronounced texture. Regardless of the orientation of the central copper rod, the iron crystals of the envelope glowed on it in accordance with the principle of structural and dimensional correspondence. The copper-nickel whiskers were solid-solution single crystals containing up to 7% nickel in the copper. The concentration in the nickel was higher in the surface layer of the whiskers than in the deeper ones. This structure is related to the growth conditions and also determines some of the whisker properties. It is concluded that the differences between whiskers and ordinary single crystals are due precisely to the differences in the growth conditions. Orig. art. has: 2 figures and 1 table.

SUB CODE: 20/ SUBM DATE: 24Jul65/ ORIG REF: 005/ OTH REF: 006

Card 2/2 IC

L 47269-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6032053 SOURCE CODE: UR/0148/66/000/009/0131/0136

60
59

AUTHOR: Sharshakov, I. M.; Postnikov, V. S.

ORG: Voronezh Polytechnical Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Temperature dependence of the mechanical properties of [precipitation-hardenable] austenitic-martensitic steels

SOURCE: IVUZ. Chernaya metallurgiya, no. 9, 1966, 131-136

TOPIC TAGS: SHEAR MODULUS, TEMPERATURE DEPENDENCE, INTERNAL FRICTION, TENSILE STRENGTH, austenitic martensitic steel, steel property, precipitation hardening steel, stainless steel, chromium nickel molybdenum steel/Kh17N5M3 steel, Kh16N6 steel

ABSTRACT: The effects of heat treatment, chemical composition and strain hardening on the internal friction and mechanical properties of Kh17N5M3 precipitation-hardenable steel (nickel-5.33%, chromium-15.95%, molybdenum-3.08%, and copper-0.18%) and Kh16N6 [AISI301] stainless steel at 20—550C has been investigated. Steel specimens, after being heat treated under various conditions, were tested. On the basis of obtained results, the temperature dependence of internal friction, tensile strength and sheer modulus was plotted. Fig. 1 shows this dependence for Kh17N5M3 steel with curve numbers referring to the following heat treatments: 7 - annealed at 1500C for 4 hr and furnace cooled; 8 - same as 7 and additionally annealed at 930C for 20 min and air cooled; 9 - annealed at 930C for 20 min and air cooled; 10 - same as 9 and additionally refrigerated at -78C; 11 - annealed at 1000C and air cooled. It was

Card 1/3 UDC: 669.15-194:669.26'24'28:620.17

L 47289-66

ACC NR: AP6032053

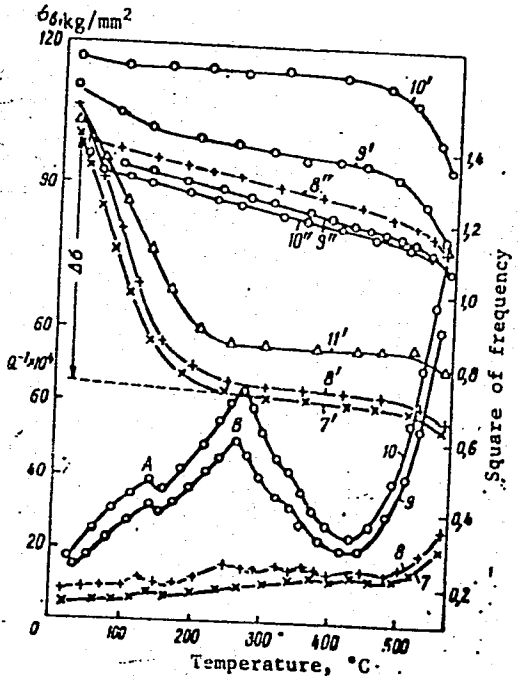

Fig. 1. Temperature dependence of internal friction ($Q^{-1}\cdot10^{-4}$) curves 7—10, tensile strength (δ_b) curves 7'—10', and shear modulus (square of frequency) curves 7"—10" for Kh17N5M3 steel

Card 2/3

Card 3/3

ACC NR: AP7005364 SOURCE CODE: UR/0181/66/008/012/3652/3654

AUTHOR: Postnikov, V. S.; Yel'kin, Yu. M.; Meshkov, S. I.

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Internal friction in face-centered cubic metals during the course of stretching

SOURCE: Fizika tverdogo tela, v. 8, no. 12, 1966, 3652-3654

TOPIC TAGS: internal friction, metal deformation, tensile stress, cubic crystal, crystal lattice structure

ABSTRACT: This is a continuation of earlier work (in: Issledovaniya staley i splavov [Research in Steels and Alloys], p. 376, Nauka, M. 1964), dealing with internal friction in samples stretched at a constant rate. The present article is devoted to the calculation of the second component of internal friction, which takes into account the additional energy dissipation as a function of the rate of deformation. A solution of the differential equations for the deformation as a function of the time shows that the actual deformation consists of the linear part on which an elliptical hysteresis loop is superimposed, and the effect of this loop on the friction is evaluated. Numerical examples are given for aluminum by way of illustration. Orig. art. has: 2 figures and 8 formulas.

SUB CODE: 20, 11/ SUBM DATE: 13Jun66/ ORIG REF: 001/ OTH REF: 005

Card 1/1

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001342620016-6"

ACC NR: AP7005350 SOURCE CODE: UR/0181/67/009/001/0227/0231

AUTHOR: Postnikov, V. S.; Kosilov, A. T.; Ammer, S. A.

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Recovery of plastically deformed filamentary crystals of copper

SOURCE: Fizika tverdogo tela, v. 9, no. 1, 1967, 227-231

TOPIC TAGS: copper whisker, fiber crystal, plastic deformation, torsion stress, annealing, crystal growth, activation energy, crystal dislocation phenomenon

ABSTRACT: The authors investigated the recovery of plastically twist-distorted copper whiskers obtained by hydrogen reduction of chloride of copper. The deformation was carried out at room temperature with a specially constructed installation, which also made it possible to record the temperature and the twist angle of the sample with the aid of potentiometers. All the measurements were made in vacuum. The recovery was investigated under conditions of nonisothermal annealing at a heating rate of 11 deg/min, in the interval 20 - 1000C. The direction of the growth axis and the structure of the deformed samples were investigated with an x ray diffractometer (URS-50IM). The results showed that, depending on the orientation of the crystal grwoth axis, the crystals can become fully untwisted even after plastic torsion amounting to an angle of 20π. The activation energy of the recovery process depends on the temperature and on the degree of deformation. The results are interpreted from the point of view that dislocations are produced on the surface of the sample and in different glide systems,

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ACC NR: AP7005350

and after removal of the external load, the dislocations move from the surface back to their original sources, intersect, and form a stable structure at room temperature. The results agree with this simple mechanism, but it is pointed out that various types of crossings of both screw and edge dislocations and various manners by which they can emerge to the surface can affect this picture. Orig. art. has: 3 figures and 6 formulas.

SUB CODE: 20/ SUBM DATE: 22Jun66/ OTH REF: 007

Card 2/2

ACC NR: AP7005761 SOURCE CODE: UR/0126/67/023/001/0173/0176

AUTHOR: Postnikov, V. S.; Belikov, A. M.; Zolutukhin, I. V.

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Effect of cyclic heating and cooling on the fragmental structure of monocrystals of aluminum and cadmium

SOURCE: Fizika metallov i metallovedeniye, v. 23, no. 1, 1967, 173-176

TOPIC TAGS: x ray diffraction analysis, cadmium, aluminum, heating, structure cooling, crystal structure analysis / URS-50IM diffractometer

ABSTRACT: The article presents some findings on the effect of cyclic heat treatment (CHT) on the fragmental structure (angle of random orientation, size and mutual orientation of fragments) of monocrystals of 99.99% pure Al and Cd. The maximum temperatures of the cycle were 260 and 600°C and the minimum, 100 and 180°C, for Cd and Al, respectively. Fragmental structure was examined by the method of two-crystal x-ray spectrometry with the aid of a modified URS-50IM diffractometer. In the Al monocrystals the plane of the section coincided with the plane ($\bar{1}$11) and the axis of the specimen coincided with the direction (110). In the Cd

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monocrystals the plane of the section coincided with the plane ($\bar{1}100$) and the axis of the specimen was parallel to the direction ($11\bar{2}0$). The increase in fragmentation and changes in the orientation of individual fragments as a result of CHT were determined by photographing the unbounded (nondiaphragmed) reflected beam following every discrete movement of the film and rotation of the monocrystal through 1' for Cd and 1-2' for Al. After this the specimens again were subjected to CHT and again inserted in the holder in their previous position with the aid of a microscope and the beam from the same fragments was photographed. The mean static angles of random orientation of the fragments, which in Al and Cd monocrystals amounted to 20-30' and 5-7', respectively, were determined as a function of the half-width of the recorded curve of oscillation of the monocrystals. Findings: For Al monocrystals, the maximum angle of random orientation is 18'. After 1000 heating cycles there is still no marked change in fragmental structure; the fragments retain their equiaxial shape and there is no marked change in the angles of their mutual orientation. A completely different picture is observed for Cd monocrystals. Their fragments display a lamellar structure and following CHT they are comminuted and bent. The lamellae lie in the (0001) plane and extend in the direction ($11\bar{2}0$). This is due to the anisotropy of the coefficient of thermal expansion in hexagonal fragmental monocrystals of Cd due to the random orientation of neighboring fragments, and hence also to the occurrence of considerable stresses which may crush the fragments and alter their orientation during CHT." In conclusion the authors wish to express their gratitude to V. A. Likhachev

ACC NR: AP7005761

and A. N. Orlov for discussion of this project and valuable comments." Orig. art. has: 2 figures.

SUB CODE: 11, 20/ SUBM DATE: 04May66/ ORIG REF: 005/ OTH REF: 002

Card 3/3

L 43954-66 EWP(e)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/GD.

ACC NR: AT6026907 SOURCE CODE: UR/0000/66/000/000/0045/0050

AUTHOR: Ammer, S. A.; Kosilov, A. T.; Postnikov, V. S. (Professor; Doctor of physico-mathematical sciences)

ORG: none

TITLE: Effect of size, impurities and deformation on the internal friction and strength characteristics of whiskers

SOURCE: AN SSSR. Institut metallurgii. Vnutrenneye treniye v metallakh i splavakh (Internal friction in metals and alloys). Moscow, Izd-vo Nauka, 1966, 45-50

TOPIC TAGS: copper whisker, ~~copper~~ iron, ~~whisker~~, ~~whisker~~ shear modulus, metal whisker, internal friction, ~~whisker strength~~

ABSTRACT: The internal friction and tensile strength of pure copper and copper-iron whiskers has been investigated in a vacuum of $2 \cdot 10^{-5}$ mm Hg at room temperature. The internal friction of copper whiskers increased continuously with increasing whisker diameter (see Fig. 1), while the tensile strength continuously decreased. The internal friction of pure copper whiskers was found to be very sensitive to strain hardening. For instance, the internal friction of a whisker strained to the stage of light slip was 20 times higher than that of unstrained whiskers, but it was restored to the original level by annealing at 700C for 1 hr. Iron increases the internal

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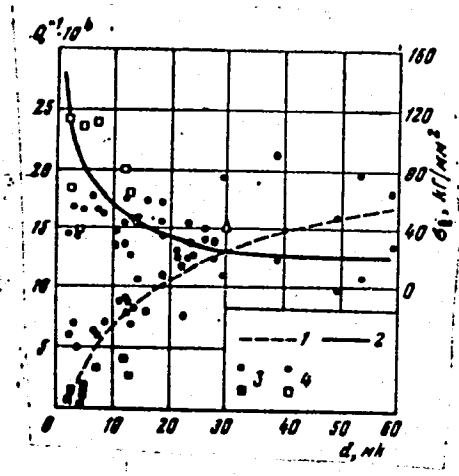

Fig. 1. Internal friction (Q^{-1}) and tensile strength (δ_B in kg/mm^2) of pure copper whiskers of different diameters (d in microns)

1 - Internal friction; 2 - tensile strength; 3 - minimum value of internal friction and of 4 - corresponding shear modulus.

fr[illegible] lowers the strength of thin whiskers, and increases the strength of th[illegible] whiskers. Iron also makes the internal friction less sensitive to strain harde[illegible]ng. Orig. art. has: 4 figures and 1 table.

SUB CODE: 11/ SUBM DATE: 02Apr66/ ORIG REF: 009/ OTH REF: 010/ ATD PRES: 96/

Card 2/2 mjs

L 41621-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6013357 SOURCE CODE: UR/0370/66/000/002/0058/0060

AUTHOR: Balalayev, Yu. F. (Voronezh); Postnikov, V. S. (Voronezh)

ORG: none

TITLE: Ultrasonic heating of metals

SOURCE: AN SSSR. Izvestiya. Metally, no. 2, 1966, 58-60

TOPIC TAGS: ultrasonic [redacted], metal grain structure

ABSTRACT: An experiment is described which confirmed the overheating of grain boundaries as compared to the body of the metal in 1Kh18N9T steel acted upon by ultrasonic vibrations. The induced microstructural changes were followed by means of high-temperature metallography on cylindrical specimens with highly polished walls. The microstructure resulting from selective oxidation showed the heating caused by the ultrasound to be inhomogeneous and indicated an "overheating" of the grain boundaries due to viscous slip along these boundaries and to processes of microplastic grain-boundary deformation. The migration of boundaries took place in both unannealed specimens and specimens thoroughly preannealed at temperatures above the heating temperature associated with the ultrasonic effect. Loosening of the boundaries may be due to the coagulation of vacancies formed as a result of the movement and interaction of dislocations during cyclic deformation. It is concluded that ultrasonic heating is a convenient method which makes it possible to change the state of a metal in a short

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L 41621-66
ACC NR: AP6013357

period of time, and to follow the changes taking place in a metal placed in an alternating mechanical field by means of metallography and other techniques. Orig. art. has: 4 figures.

SUB CODE: 11/ SUBM DATE: 10Oct64/ ORIG REF: 005

Card 2/2 hs

L 41014-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6021708 (N) SOURCE CODE: UR/0148/66/000/003/0136/0139

AUTHOR: Usanov, V. V.; Postnikov, V. S.; Burmistrov, V. N.

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Certain features of martensitic transformation in steels of the austenitic-martensitic class

SOURCE: IVUZ. Chernaya metallurgiya, no. 3, 1966, 136-139

TOPIC TAGS: martensitic transformation, austenite steel, martensite steel, torsional vibration, internal friction, metal grain structure

ABSTRACT: This is a continuation of previous investigations (V. S. Postnikov et al. Izv. VUZ, Chernaya metallurgiya, 1964, no. 11; V. S. Postnikov et al. Sb. Instituta metallurgii im. Baykova, "Issledovaniye staley i splavov," Izd-vo "Nauka," 1964, 367), with the difference that it deals with certain features of the course of $\gamma \rightarrow M$ transformation in austenitic steels of the transition class, as determined by tests of internal friction, resistivity, and magnetometry and dilatometry in the process of cooling. These steels, conditionally denoted 1 and 2, contain 0.07 and 0.08% C, 16.8 and 15.98% Cr, 5.35 and 5.35% Ni, and 1.85 and 3.08% Mo, respectively. In all tests the specimens were heated to temperatures T_{on} of the onset of martensitic

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transformation (750-1000°C) for 20 min, after which the corresponding curves of cooling were plotted at ~6 deg/min. Findings: the peak of internal friction, as determined with the aid of a torsional pendulum, consists of a principal peak A and a secondary peak B, the latter detectable during careful measurements of internal friction in the process of cooling below the temperature of the principal peak (Fig. 1). Curve 3 (Fig. 1) shows a change in the height of peak A* on increase in frequency from 0.4 to 16 cps: the increase in frequency from 0.4 to 1 cps increases the height of the peaks but any further increase in frequency (to 16 cps) reduces this height sharply. With increase in oscillation amplitude the peaks A and B get displaced into the region of higher temperatures; then the height of the peaks (and particularly of A) sharply increases (Fig. 2). The sharp increase in the internal friction of austenitic steels in the temperature range of 120-160°C (Fig. 3) during their cooling from normalizing temperatures is due to $\gamma \rightarrow$ M transformation. Thus, the highly sensitive internal-friction tests reveal the existence of a double $\gamma \rightarrow$ M transformation due to the inhomogeneity of the grain composition of cold austenite; this could not be detected with the aid of the other physical tests used in this investigation. The nature of the peak B and the mechanism of $\gamma \rightarrow$ M transformation are as yet unclear.

L 41011-66

ACC NR: AP6021708

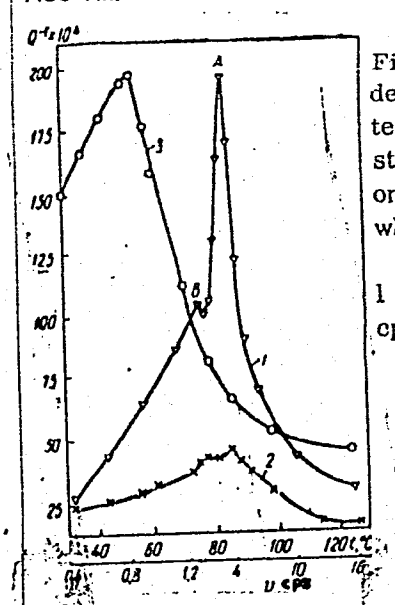

Fig. 1. Frequency dependence of the height of internal-friction peak for steel 2 (3) and its position on the temperature scale when:

1 - ν_1 = 1 cps; 2 - ν_2 = 16 cps; T_{on} = 850°C

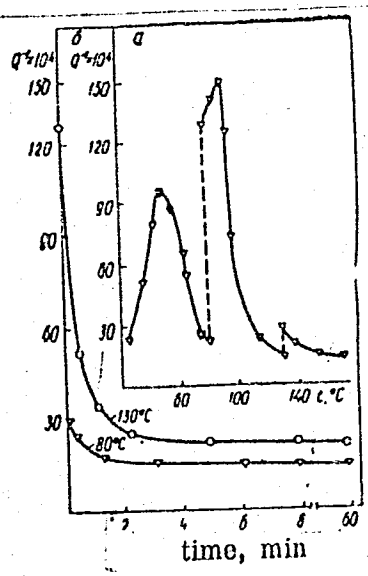

Fig. 2. Variation in the curve of internal-friction peak for steel 2 when T_{on} = 850°C and ν = 1 cps, as a function of:

a - isothermal exposure; b - isothermal variation in internal friction

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L 41014-66

ACC NR: AP6021708

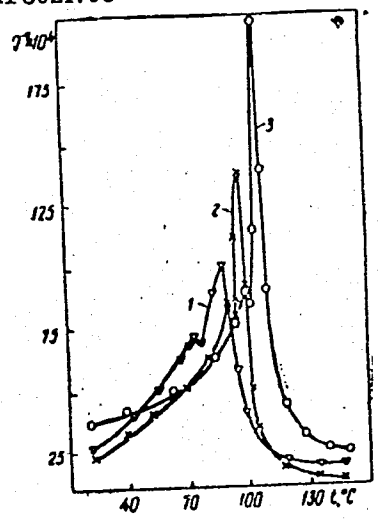

Fig. 3. Amplitude dependence of internal-friction peaks A and B for steel 1 when T_{on} = 850°C and ν = 1.2 cps:

1 - τ_1 = 0.3 kg/mm^2; 2 - τ_2 = 2.5 kg/mm^2; 3 - τ_3 = = 3.3 kg/mm^2

Orig. art. has: 4 figures.

SUB CODE: 11, 20, 13/ SUBM DATE: 18Jan65/ ORIG REF: 005/ OTH REF: 002

Card 4/4 hs

L 40927-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6030180 SOURCE CODE: UR/0148/66/000/C05/0144/0146

50
B

AUTHOR: Postnikov, V. S.; Sharshakov, I. M.; Usanov, V. V.

ORG: Voronezh Polytechnical Institute (Voronezheskiy politekhnicheskiy institut)

TITLE: Amplitude frequency dependence of the internal friction of certain steels

SOURCE: IVUZ. Chernaya metallurgiya, no. 5, 1966, 144-146

TOPIC TAGS: internal friction, austenite transformation, plastic deformation, carbon steel, chromium steel, nickel steel, torsional vibration/50 carbon steel, Kh17N5M3 chromium steel, Kh16N6 chromium steel, Kh16N11 chromium steel

ABSTRACT: Any measure of internal friction is understandably divided into two components: amplitude-independent and amplitude-dependent. This division is arbitrary since these forms of internal friction usually overlap one another and likewise can be interrelated.

In connection with contradictory experimental data relative to the frequency relationship of the contributions of both types of internal friction and the almost complete lack of these data for low-frequency torsion vibrations, the present research was undertaken. Carbon steel 50 and chromium-nickel steels Kh17N5M3, Kh16N6, and Kh16N11 were used. The internal friction was measured on a torsion pendulum on specimens 1 mm in diameter and 100 mm long. The shear strain amplitude was measured between $3 \cdot 10^{-5}$ to $8 \cdot 10^{-4}$ and frequency from 0.4 to 18 cps. Recording of data at low frequencies was done visually but at the high frequencies with an N700 vibration oscilloscope.

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ACC NR: AP6030180

Before measurement of internal friction all specimens were annealed in a closed quartz tube at 1050°C for 4 hours. The Cr-Ni-steel specimens were later subjected to normalization at 800-1100°C and the steel 50 specimens were quenched in water from 740°C.

Resulting data were in agreement with results obtained by others. The increase in shear strain amplitude to $1-2 \cdot 10^{-4}$ does not change the value of internal friction. Further increase in the shear strain amplitude leads to an increase in internal friction.

The increase in internal friction level with the normalizing temperature decrease is associated with the transformation of austenite into martensite and their different inclination to plastic microdeformation.

The increase in vibration frequency of the specimen from 0.4 to 2.5 cps for steel Kh17N5M3 (and Kh16N11) and to 4 cps for steel 50 does not have any noticeable effect on the internal friction components. Further increase in vibration frequency of the specimen increases the internal friction whereupon the greater the shear strain amplitude the sharper the increase in internal friction. Orig. art. has: 4 figures. [JPRS: 36,774]

SUB CODE: 11, 20 / SUBM DATE: 17Dec64 / ORIG REF: 006 / OTH REF: 006

Card 2/2

L 44397-66 EWT(m)/EWP(w)/T/EWP(t)/ETI/EWP(k) IJP(c) JD/HW
ACC NR: AP6024527 SOURCE CODE: UR/0148/66/000/007/0123/0125

AUTHOR: Sharshakov, I. M.; Postnikov, V. S.

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Some physicomechanical properties of austenitic-martensitic type steels

SOURCE: IVUZ. Chernaya metallurgiya, no. 7, 1966, 123-125

TOPIC TAGS: austenitic steel, martensitic steel, cold deformation, martensitic transformation, internal friction, mechanical property, magnetic property, metallographic examination / Kh17N5M3 steel, Kh16N6 steel

ABSTRACT: A stydy was made of the effect of plastic deformation on internal friction Q^{-1}, magnetic properties, ultimate strength and relative elongation for steels having the following compositions:

	C	Ni	Cr	Mo	Mn	Si
Kh17N5M3	0.08	5.33	15.95	3.08	0.20	0.24
Kh16N6	0.06	6.35	16.38	-	0.50	0.36

The steels were annealed, drawn into wire with diameters ranging from 0.71 to 0.95 mm, normalized at 975 (Kh16N6) and 930°C (Kh17N5M3) and again drawn into wire of 0.7 mm diameter; initial amounts of deformation were in the range 0-45%. The dependence of all physicomechanical properties on deformation was identical for both steels. In the

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L 44297-66

ACC NR: AP6024527

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first region (0-9% deformation) the values of Q^{-1}, strength and magnetization rose sharply while relative elongation dropped sharply. In the second region (9-20% deformation) the above properties changed only slightly. In the third region (20-45% deformation) Q^{-1}, strength and magnetization again rose while elongation dropped. The plastic deformation changed austenite into martensite resulting in strengthening. Microstructures consisted of residual austenite, carbides at grain boundaries and martensite. With increased amounts of deformation the quantity of martensite increased, raising magnetization due to the increased amount of ferromagnetic phase. For 0-10% deformation, the increased strength was not due to martensite but to cold working of austenite. In the second region, martensitic strengthening was slight but in the third region martensite played a dominent role in changing the properties. Orig. art. has: 2 figures, 1 table.

SUB CODE: 11,20/ SUBM DATE: 02Feb65/ ORIG REF: 010

Card 2/2 egb

L 36109-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD
ACC NR: AP6017309 (A, N) SOURCE CODE: UR/0126/66/021/005/0770/0773

AUTHORS: Postnikov, V. S.; Ammar, S. A.; Kosilov, A. T.; Bolikov, A. M. 10 B

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Relaxation properties of copper-iron thread-like crystals

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 5, 1966, 770-773

TOPIC TAGS: copper containing alloy, iron containing alloy, metal crystal, metal whisker, copper whisker

ABSTRACT: The inner friction, shear modulus, electrical resistance, and crystal structure of copper-iron crystal whiskers were studied. The whiskers were obtained after the method of T. S. Ke and Y. K. Wan (Scienta Sinia, 1961, 10, 3, 301). The experimental results are shown graphically (see Fig. 1). The curve of inner friction vs temperature exhibited a peak in the region of 400--500C. It is concluded that the iron-copper whiskers represent a supersaturated solid solution. The energy of activation for the decomposition of the supersaturated solution as determined by the method of V. S. Postnikov (DAN SSSR, 1953, 91, 79) was 30 kcal/mole.

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ACC NR: AP6017309

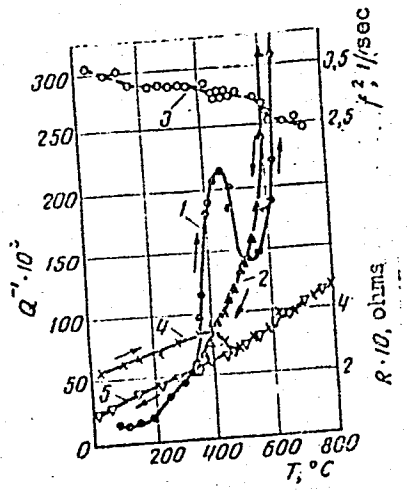

Fig. 1. Temperature dependence of inner friction Q^{-1}, shear modulus G, and electrical resistance R of copper-iron whiskers: 1 - Q^{-1} for slow rate of heating of specimen; 2 - the same for slow cooling; 3 - G for heating; 4 - R for heating; 5 - the same for cooling at a rate of 2.5 degrees/min.

Orig. art. has: 4 figures.

SUB CODE: 11/ 20/ SUBM DATE: 04May65/ ORIG REF: 007/ OTH REF: 004

LS

Card 2/2

L 36984-66 EWP(k)/EWT(d)/EWT(m)/EWP(h)/T/EWP(l)/EWP(v)/EWP(t)/ETI IJP(c)

ACC NR: AP6012222 JD SOURCE CODE: UR/0032/66/032/004/0492/0493

50
B

AUTHOR: Postnikov, V. S.; Kosilov, A. T., Ammer. S. A.

ORG: Voronezh Polytechnic Institute (Voronezhskiy politekhnicheskiy institut)

TITLE: Apparatus for the study of internal friction and the modulus of elasticity of whisker crystals by the method of bending vibrations

SOURCE: Zavodskaya laboratoriya, v. 32, no. 4, 1966, 492-493

TOPIC TAGS: metal whisker, internal friction, elastic modulus, vibration stress

ABSTRACT: The apparatus described in the article makes it possible to study whiskers up to 40 mm long with a diameter from 5 to 150 microns, over a frequency range from 30 to 800 cycles, at temperatures from -190 to +600°C, in a vacuum of the order of 10^{-5} mm Hg. The article gives a detailed block diagram of the apparatus and also a diagram of the construction of the sensing device. The apparatus has been used in practice to measure the internal friction of copper whiskers of various diameters at room temperatures; the value was of the order of 10^{-3}. Orig. art. has: 2 figures.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 002/ OTH REF: 002
UDC: 620.174.22:105

Card 1/1 bb

L 6990-66 EWT(m)/EWA(c)/EWP(b)/T/EWP(t) IJP(c) DJ/JD

ACC NR: AP5017336 SOURCE CODE: UR/0181/65/007/007/2242/2244

AUTHOR: Ammer, S. A.; Kosilov, A. T.; Postnikov, V. S. 52 48

ORG: Voronezh Polytechnical Institute (Voronezhskiy politekhnicheskiy institut) B

TITLE: Internal friction and filament strength of Cu crystals

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2242-2244

TOPIC TAGS: copper whisker, annealing, crystal dislocation, internal friction, torsional vibration

ABSTRACT: The influence of cross-section area of filamentary Cu crystals on strength and internal friction was studied. For this work, high purity Cu whiskers were grown by Brenner's method [S. S. Brenner, Acta Met., 4, 62, 1956], i.e., the hydrogen reduction of gaseous Cu salts at 560-570°C. The experimental samples had both very smooth and roughened surfaces. Internal friction tests were conducted at room temperature in a vacuum ($2 \cdot 10^{-5}$ mm Hg). The axial stress on the Cu whiskers of 5 micron diameter never exceeded 100 g/mm^2. The data is presented in fig. 1. The figure shows significant scattering, it places the dependence of Q^{-1} and σ on diameter. Above about 20 microns, the internal friction has a value approaching that of ordinary single crystals; below 10 microns, the lowering of the internal friction is characterized by large increases in strength. These facts are correlated with disloca-

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tion behavior, as evidenced by experiments with filaments having roughened surfaces.

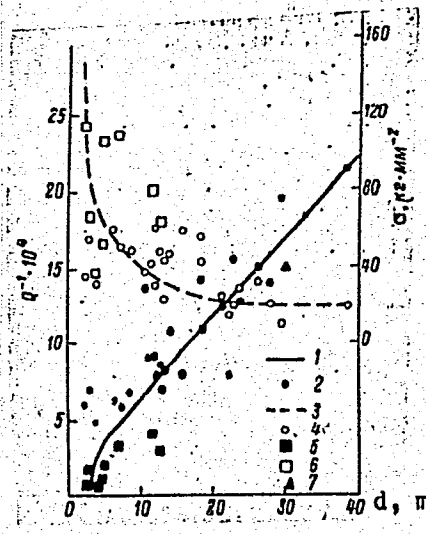

Fig. 1. Dependence of internal friction Q^{-1} and the strength σ of Cu whiskers for varying diameters. 1,2--internal friction; 3,4--strength; 5--minimum values of internal friction; 6--characteristic strength; 7--Schurer's data.

These samples had low strengths but retained their low values of Q^{-1}. The explana-

L 6910-66
ACC NR: AP5017336

tion offered is based on the different behaviors of surface and volume dislocations; surface dislocations are extremely effective in lowering strength, while volume dislocations affect Q^{-1} by raising it. This was demonstrated by testing cold worked filaments of 4.8 microns diameter. The internal friction increased about 20 times, showing the effects of volume dislocations, i.e. Q^{-1} was raised while σ remained constant. By annealing these same samples, Q^{-1} was almost fully restored; the annealing schedule used was 700°C for one hour. The effects of the annealing are explained by dislocation locking by impurities, or to the annihilation of dislocations formed during cold working. In closing, the authors mention the influence of lowering the degree of vacuum on Q^{-1}; changing the vacuum pressure from $2 \cdot 10^{-5}$ mm Hg to 10^{-3} mm Hg increased Q^{-1} by as much as 10 times. Also, the technique of clamping the samples affected the value of Q^{-1}. Orig. art. has: 1 figure.

SUB CODE: MM/ SUBM DATE: 03Feb65/ ORIG REF: 006/ OTH REF: 007

Card 3/3 nds

ZOLOTUKHIN, I.V.; POSTNIKOV, V.S.

Defects in single crystals of aluminum obtained during cyclic heat treatment. Fiz. met. i metalloved. 18 no.6:933-935 D '64. (MIRA 18:3)

1. Voronezhskiy politekhnicheskiy institut.

GORSHKOV, G.A. (Voronezh); POSTNIKOV, V.S. (Voronezh)

Changes in the internal friction of aluminum, cadmium, and copper dependent on cyclic deformation. Izv. AN SSSR. Met. no.1:108-112 Ja-F '65. (MIRA 18:5)

L 63976-65 EWA(c)/EWT(m)/EWP(b)/T/EWA(d)/EWP(e)/EWP(w)/EWP(t) JD

ACCESSION NR: AP5013326 UR/0148/65/000/005/0140/0144
548.0:539

AUTHOR: Postnikov, V. S.; Ammer, S. A.

TITLE: Elastic moduli and strength of metal whiskers

SOURCE: IVUZ. Chernaya metallurgiya, no. 5, 1965, 140-144

TOPIC TAGS: crystallography, metal whisker, copper, metal physical property, metal mechanical property

ABSTRACT: X ray analysis shows that copper whiskers may have three crystallographic orientations for the longitudinal axis ([111], [100] and [110]) with corresponding variations in the geometry of the cross sections. Whiskers with their axis parallel to direction [111] are hexagonal in cross section, those with orientation [100] are square, and when the orientation is [110] the whisker has a rectangular cross section. This close relationship between the orientation of the crystals and the shape of their cross section makes it possible to determine the direction of the longitudinal axis by microscopic study of the cross section of the crystal, without resorting to x ray analysis. On this basis, the authors studied the strength and

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L 63976-65

ACCESSION NR: AP5013326

elastic moduli of copper whiskers as a function of orientation. Smooth elastic whiskers were chosen without visible surface defects at 500× magnification under an MIM-7 microscope. The specimens were 2-3 mm long with a cross sectional area of 2.3-70 μ^2. The breaking point of the crystals was determined, i.e. the maximum stress which the crystal could sustain before destruction. Twenty square and twenty-one hexagonal crystals were measured at room temperature (see fig. 1 of the Enclosure). The shear modulus was defined as the square of the frequency of the normal torsional mode of the specimen:

$$G = \frac{8\pi IL}{R^4} f^2,$$

where I is the moment of inertia of the torsionally oscillating system; L and R are the length and radius of the specimen; and f is the oscillation frequency. The measurements were made in a vacuum of the order of 10^{-3} mm Hg. The shear modulus measurements were done on crystals with cross sections ranging from 40 to 100 μ^2. The frequency of the torsional oscillations was of the order of 1 cps. The maximum shearing stress did not exceed 10 g/mm^2. The radius R is usually defined for whiskers as $\sqrt{S}$ where S is the area of the cross section. The results of tests on 28

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ACCESSION NR: AP5013326

square and 23 hexagonal whiskers are shown in fig. 1 of the Enclosure. These data confirm the generally accepted relationship between the breaking point and cross section of whiskers. The thinnest crystals have the highest strength, close to theoretical. Their breaking point is ten times that of ordinary copper single crystals. Surface defects are responsible for the scatter in the data. The average breaking point of square whiskers in the 2.3-10 μ^2 range is about $\frac{1}{2}$ that of hexagonal whiskers in the same range (63 kg/mm^2 compared with 128 kg/mm^2). This shows that the modulus of elasticity in whiskers depends on the orientation of the longitudinal axis. Orig. art. has: 2 figures.

ASSOCIATION: Voronezhskiy politekhnicheskiy institut (Voronezh Politechnic Institute)

SUBMITTED: 31Aug64 ENCL: 01 SUB CODE: MM, SS

NO REF SOV: 007 OTHER: 002

Card 3/4

L 63976-65

ACCESSION NR: AP5013326

ENCLOSURE: 01

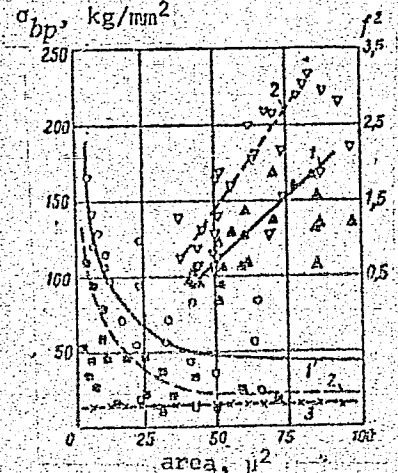

Fig. 1. Breaking point and f^2 of the normal torsional mode as functions of the dimensions and shape of the cross section in copper whiskers: 1--(○, ▲)--orientation [111]; 2--(▫, ▽)--[100]; 3--strength of ordinary copper single crystals.

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POSTNIKOV, V.S.; USANOV, V.V.; SHARSHAKOV, I.M.

Effect of heat treatment on the physicomechanical properties of austenite-martensite class steels. Izv. vys. ucheb. zav.; chern. met. 7 no.11:149-154 '64. (MIRA 17:12)

1. Voronezhskiy politekhnicheskiy institut.

L 8561-65 EWT(m)/EPR/EWP(q)/EWP(b) Pe-4 AFWL/SSD/ASD(a)-3/ESD(c) JD/JW
ACCESSION NR: AR4044210 S/0137/64/000/006/I038/I038

SOURCE: Ref. zh. Metallurgiya, Abs. 6I225

AUTHOR: Postnikov, V. S.; Gorshkov, G. A. B

TITLE: Restoration of internal friction of aluminum after cyclic deformation

CITED SOURCE: Sb. Relaksats. yavleniya v met. i splavakh. M., Metallurgizdat, 1963, 115-119

TOPIC TAGS: internal friction, aluminum, cyclic deformation, wire, torsional oscillation

TRANSLATION: By method of low-frequency torsional oscillations of small amplitude is investigated the isothermal restoration of internal friction of wire sample 1.4 mm in diameter 100 mm long made from brand AOM aluminum, preliminarily subjected to cyclic torsion. First the samples were annealed at 450° for 1 hour.

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L 8561-65
ACCESSION NR: AR4044210

Cyclic deformation was set at a frequency of 1200 cycle/minute. Measurement of internal friction started 2 min after cyclic deformation ceased. There are obtained curves of the restoration of internal friction of Al at room temperature vs the number of cycles of deformation. The internal friction of samples first subjected to cyclic deformation decreases with time. Here, with an increase of the number of cycles of deformation, both the "initial" (after 2 min) and "final" (after 2 hours) internal friction increases, attaining a certain stable value. At relatively high stresses (± 7.8 kg/mm^2 instead of ± 3.9 mg/mm^2) and the same temperature, such stabilization of internal friction sets in at a significantly smaller number of cycles. Shortly before destruction of the samples the internal friction again increases. With an increase in the number of cycles of deformation, the curves of internal friction vs time of isothermal holding are more balanced, which indicates a delay in the process of restoration of internal friction. The obtained value of activation energy (4000-5000 cal/mole) shows that restoration of internal friction after cyclic deformation is due not to diffusion effects but, apparently, to effects caused by the redistribution of dislocations. The three sections (stage of monotonic growth, stabilization, and repeated growth) revealed on the curves of internal friction vs number of cycles of deformation

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L 8561-65
ACCESSION NR: AR4044210

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are associated with the development of consecutive phases of fatigue (accumulation of defects, the settling and coagulation of vacant sites leading to the formation of micro-cracks, macrodestruction). Bibliography: 12 references.

SUB CODE: IC, AS ENCL: 00

Card 3/3

L 14994-65 EWT(m)/EWP(w)/EWA(d)/EPR/EWP(t)/EWP(b) Ps-4 ASD(m)-3/AFTC(p)
ACCESSION NR: AT4048124 JD/MLK S/0000/63/000/000/0105/0111

AUTHOR: Postnikov, V. S., Zolotukhin, I.V.

TITLE: Investigation of thermal fatigue of aluminum-copper alloys by the internal friction method

SOURCE: Vsesoyuznaya konferentsiya po relaksatsionnym yavleniyam v metallakh i splavakh. 3d, Voronezh, 1962. Relaksatsionnyye yavleniya v metallakh i splavakh (Relaxation phenomena in metals and alloys); trudy* konferentsii. Moscow, Metallurgizd..., 1963, 105-111

TOPIC TAGS: aluminum alloy, copper containing alloy, thermal fatigue, internal friction

ABSTRACT: This paper is a continuation of previous investigations of thermal fatigue of pure metals and alloys by the internal friction method. The previous publications considered Cd-Zn alloys with strongly expressed expansion anisotropy. The alloys tested in the present paper contained 0.5, 4, 5.5, 10 and 33.8% Cu (by weight). The alloy ingots were 6 mm in diameter and 120 mm long. Samples of 100 mm length and a cross section of 1 mm^2 were annealed for 1 hour in the same device employed for measuring internal friction and for the heating-cooling cycles. Variation of sample length was checked by a MIR-12 microscope with an

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L 14994-65
ACCESSION NR: AT4048124

accuracy of 0.02 mm. The tests indicated that internal friction and elongation of high-Cu alloys at high temperatures vary in the same way, while at room temperature and with low copper content they vary in opposite directions. An increase in the maximum temperature of the heating-cooling cycle leads to a sharp drop in internal friction when the number of cycles increases. The internal friction curve for a heating-cooling cycle is about the same for polycrystalline materials and for single crystals. The grain structure greatly influences elongation. The authors conclude that small additions of copper almost completely suppress the maximum of internal friction in aluminum, which is considered to be of the "grain boundary" type. On the basis of tests it was determined that further investigations are required on the thermal fatigue of single crystal alloys. The increase in internal friction at room temperature in direct proportion to the number of heating-cooling cycles leads to distortion of the lattice of the basic alloying element (aluminum). The lowest internal friction and elongation are observed in the Al-Cu alloy with 5.5% Cu. Orig. art. has: 7 figures and 1 table.

ASSOCIATION: Voronezhskiy politekhnicheskiy institut (Voronezh Polytechnical Institute)

SUBMITTED: 10Nov63 ENCL: 00 SUB CODE: MM

Card 2/2 NO REF SOV: 006 OTHER: 003

L 17520-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b) ASD(m)-3/SSD/AFWL/AFETR JD/HW

ACCESSION NR: AP4049069 S/0148/64/000/011/0149/0154

AUTHOR: Postnikov, V. S.; Usanov, V. V.; Sharshakov, I. M.

TITLE: Effect of heat treatment on physical and mechanical properties of austenitic-martensitic steels

SOURCE: IVUZ. Chernaya metallurgiya, no. 11, 1964, 149-154

TOPIC TAGS: austenitic martensitic steel, precipitation hardenable steel, internal friction, resistivity, structure property

ABSTRACT: Five austenitic-martensitic stainless steels (see Table 1 of the Enclosure) were studied by measuring their internal friction and resistivity on cooling from 700—1200C and, in some cases, on heating in an attempt to determine the effect of annealing temperature on the character of structural changes and mechanical properties. The temperature dependence of the internal friction and resistivity of steels A, B, C, and E was found to follow the same pattern (see Fig. 1 of the Enclosure). No peaks were observed on internal friction-temperature or resistivity-temperature curves for steel D which, unlike the rest of the steels, had a fully

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L 17520-65
ACCESSION NR: AP4049069

austenitic structure after annealing and air cooling. Temperatures of the peaks of internal friction coincide with those of resistivity peaks and the M_s temperatures for A, B, C and E steels. The level of internal friction at room temperature drops continuously with annealing temperature increased up to 850—1000C and rises sharply with further increases of temperature. Tha latter increase is explained by an increased stability of austenite and by some changes in δ-ferrite, apparently a precipitation of σ-phase on the γ-δ interface. Orig. art. has: 4 figures and 1 table.

ASSOCIATION: Voronezhskiy politekhnicheskiy institut (Voronezh Polytechnic Institute)

SUBMITTED: 20Apr64 ENCL: 02 SUB CODE: MM

NO REF SOV: 009 OTHER: 000 ATD PRESS: 3151

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L 17520-65
ACCESSION NR: AP4049069

ENCLOSURE: 01

Table 1. Chemical composition of austenitic-martensitic stainless steels

	C	Cr	Ni	Mo	W	Al
A	0,07	16,80	5,35	1,85	—	—
B	0,10	15,33	5,85	—	—	0,72
C	0,08	16,45	6,53	2,36	0,8	—
D	0,07	16,02	11,1	—	—	—
E	0,09	16,13	6,99	—	—	—

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L 17520-65
ACCESSION NR: AP4049069

ENCLOSURE: 02

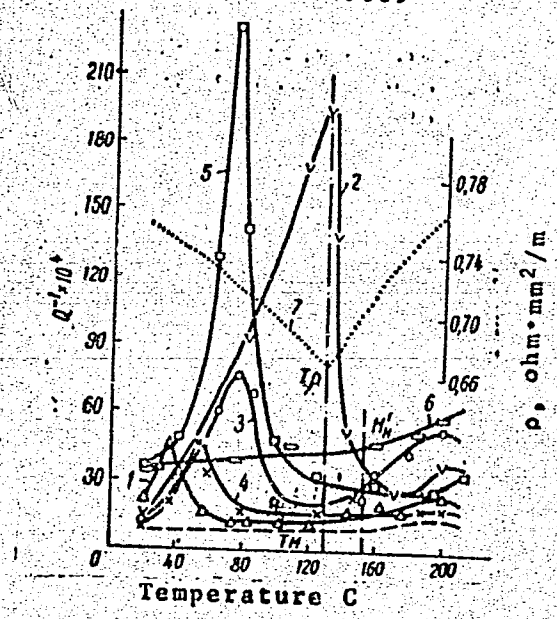

Fig. 1. Temperature dependence on internal friction of Steel A during cooling from 750C (1), 850C (2), 950C (3), 1050C (4), 1200C (5), and heated after cooling from 1200C (6), and of resistivity during cooling from 850C.

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L 9963-65 EWT(m)/T/EWP(b) MJW/JD/MLK

ACCESSION NR: AT4046870 S/0000/64/000/000/0367/0375

AUTHOR: Postnikov, V. S., Gorshkov, G. A., Zolotukhin, I. V., Sharshakov, I. M., Usanov, V. V.

TITLE: Effect of different kinds of treatment on some properties of SN-2 and SN-3 steel

SOURCE: AN SSSR. Nauchny*y sovet po probleme zharoprochny*kh splavov. Issledovaniya staley i splavov (Studies on steels and alloys). Moscow, Izd-vo Nauka, 1964, 367-375

TOPIC TAGS: steel structure, steel crystallization, normalizing, steel strength, steel internal friction, steel cold working, stainless steel

ABSTRACT: High-strength stainless steels of the transient austenitic-martensitic class are widely used. Since they are between the austenitic and martensitic grades their properties may be changed with ease. In the present article, the effects of normalizing, cold working and aging on SN-2 and SN-3 steels are considered. The chemical composition of the steel, supplied by a plant in Voronezh, was standard. Internal friction was investigated by a pendulum and on a device designed by V. V. Usanov and I. M. Sharshakov for samples 5 mm in diameter and 60 mm long. Microhardness was determined on the PMT-3 device.

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ACCESSION NR: AT4046870

limiting strength on the MP-0.5 machine, and the microstructure under an MIM-8m microscope. The data are tabulated and shown in Figs. 1-3 of the Enclosure. The lowest strength and microhardness were obtained after normalizing; the highest after additional treatment by cold working and aging. All aged samples, no matter what treatment was used, had a lower strength at higher temperatures. At 450C, the strength drops sharply, while internal friction changes in the opposite way. The hardening of steel after normalizing with further cold working leads to a decrease in internal friction caused by disintegration of martensite and formation of a carbide with an increase in strength at room temperatures. Microscopic study of SN-2 steel shows that the α-γ transformation begins near 480C and ends near 750C, causing a rise in internal friction. The occurrence of this increase is not completely explained, however, since the peak on the curve for SN-2 steel depends to some extent on the normalizing temperature. Orig. art. has: 7 figures and 2 tables.

ASSOCIATION: None

SUBMITTED: 16Jun64 ENCL: 03 SUB CODE: MM

NO REF SOV: 011 OTHER: 000

L 9963-65

ACCESSION NR: AT4046870 ENCLOSURE: 01

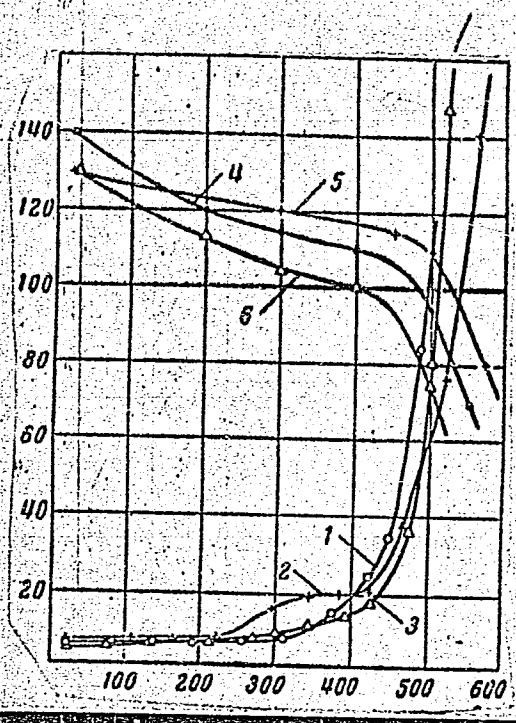

Fig. 1. Dependence of temperature curves of internal friction (1-3) and strength (4-6) of SN-2 and SN-3 steel on the mechanical and thermal treatment. Data on strength were taken from the article by M. F. Aleksenko:
1, 4-SN-2 steel, cold worked, aged at 480C for 1 hour; 2, 5-SN-3 steel, cold worked, aged at 450C for 1 hour; 3-SN-2 steel normalized from 975C, cold worked in nitrogen, aged; 6-the same, normalized from 950C, cold worked at -70C for 2 hours, aged.

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L 9963-65
ACCESSION NR: AT4046870

ENCLOSURE: 02

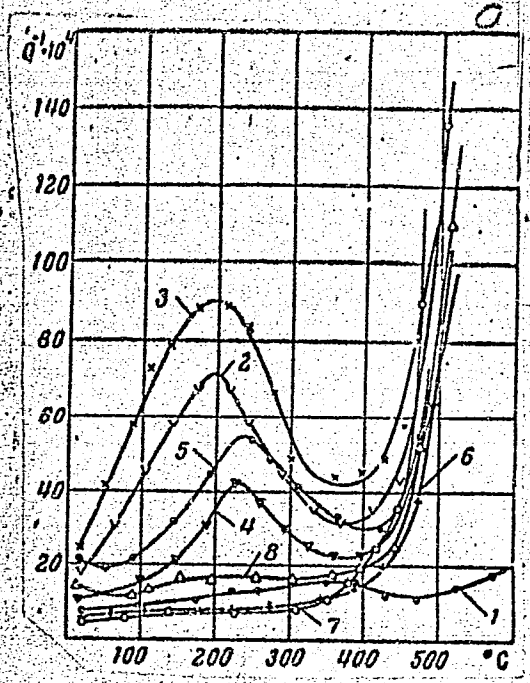

Fig. 2. Dependence of temperature curves of internal friction of SN-2 steel on mechanical and thermal treatment:
1-normalized from 975C; 2-normalized from 975C + cold working in nitorgen; 3-normalized from 975C + cold working at 70C; 4-normalized from 975C + compression of 41% 6-treatment the same as curve 2 + aging at 500C for 1 hour; 7-treatment the same as in curve 4 + aging; 8-treatment the same as curve 5 + aging.

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L 9963-65
ACCESSION NR: AT4046870

ENCLOSURE: 03

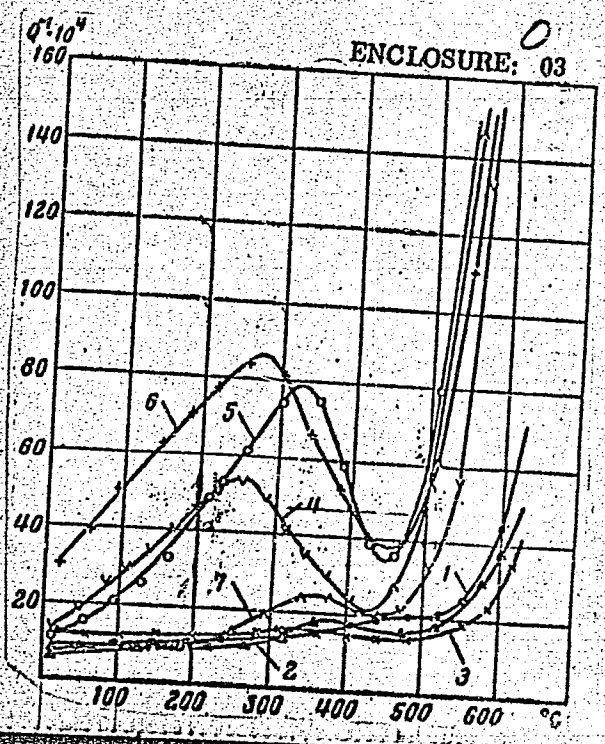

Fig. 3. Dependence of temperature curves of internal friction of SN-3 steel on mechanical and thermal treatment:
1-normalized from 930C;
2-normalized from 1050C;
3-normalized from 1100C;
4-normalized + cold working in nitrogen;
5-normalized + compression of 30%;
6-normalized + cold working in nitrogen + compression of 30%;
7-normalized + compression of 30% + aging.

Card 5/6

L 12970-65 EWT(m)/EWP(w)/EWA(d)/EW[illegible]/EWP(b) JD

ACCESSION NR: AR4041614 S/0137/64/000/005/I054/I054

SOURCE: Ref. zh. Metallurgiya, Abs. 5I315

AUTHOR: Postnikov, V. S.; Sharshakov, I. M.; Maslennikov, E. M.

TITLE: Grainlimited relaxation of stresses in pure metals

CITED SOURCE: Sb. Relaksats. yavleniya v met. i splavakh. M., Metallurgizdat, 1963, 165-170

TOPIC TAGS: grainlimited relaxation, stress relaxation, metal, internal friction

TRANSLATION: On 23 pure metals in annelaed state peaks on curves of temperature dependency of internal frictions were investigated, connected with tough behavior of boundaries of grains. Investigations were carried out with the help of improved pendulum of K'o T'ing-sui. Frequency of torsional oscillations of wire samples amounted to ~1 cps. For all investigated polycrystalline metals on curve of

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L 12970-65
ACCESSION NR: AR4041614

temperature dependency of internal friction there is peak caused by existence of grain boundaries. Height of this peak is the greatest for Al. For many metals peak of internal friction only will appear. Height of peak depends on quantity and type of impurities; very pure metals must possess high peak of internal friction. There are data that height of peak in case of Zn and Al to a significant degree depends on frequency of oscillations. Furthermore, periodic heating of single-crystal Al and macrocrystalline alloy of Al with 0.5% Cu causes appearance of peak on temperature curve of internal friction. Whereupon, the given peak appears in that region of temperatures where "grainlimited" peak of internal friction of polycrystalline Al is observed. Conclusion is drawn that peak of internal friction on curve of temperature dependency of internal friction of pure polycrystal can caused not only by viscous slips on grain boundaries, but also by some other mechanism. Bibliography: 24 references.

SUB CODE: MM, AS ENCL: 00

Card 2/2

L 9964-65 EWT(m)/T/EWP(k)/EWP(b) Pf-4 AFWL/ASD(m)-3/ASD(f)-2/SSD JD/
ACCESSION NR: AT4046871 WW/MLK S/0000/64/000/000/0376/0379

AUTHOR: Postnikov, V. S., Yel'kin, Yu. M.

TITLE: Investigation of internal friction of zinc, aluminum and copper during plastic deformation

SOURCE: AN SSSR. Nauchny*sovet po probleme zharoprochny*kh splavov. Issledovaniya staley i splavov (Studies on steels and alloys). Moscow, Izd-vo Nauka, 1964, 376-379

TOPIC TAGS: zinc, aluminum, cooper, internal friction, zinc internal friction, aluminum internal friction, copper internal friction, plastic deformation, metal lattice structure

ABSTRACT: Dislocations in the crystal lattice occur during plastic deformation of metals. To explain these, new methods for the investigation of atomic motion during plastic deformation will have to be developed. The authors cite articles by P. E. Maringer and by T. S. Ke, P. T. Yung and C. C. Chang as being the only ones to consider the variation of internal friction during plastic deformation. The present paper considers the internal

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L 9964-65
ACCESSION NR: AT4046871

friction of zinc, aluminum and cooper under plastic tension, as well as the relationship between internal friction and the deformation rate. The special testing unit was designed on a TV-16 thread-cutting lathe with tension rates from 0.00006 to 0.048 1/min. A tensiometer unit together with an EPP-09 potentiometer were used for registration. The load varied from 0 to 20 kg and was measured with an accuracy of +,1/2 kg. The logarithmic damping decrement divided by π was used as the measure of internal friction. Zinc, aluminum and cooper wires with a diameter of 1.6 mm and 250 mm long were used for testing. Figures 1, 2 and 3 of the Enclosure show the results of the tests, while Fig. 4 of the Enclosure shows the relationship between the internal friction and relative deformation rate. On the basis of these tests it was found that the internal friction of zinc, aluminum and copper vary during deformation, increasing in the second part of the elastic field. Near the limit of proportionality, the internal friction reaches a maximum and then remains constant. At this time, a dynamic equilibrium is established between the quantity of defects arising and the quantity of defects disappearing. Internal friction increases as the deformation rate increases and drops sharply when the deformation stops. For evaluating the mechanism of this phenomenon, further investigations are required to determine the various factors having an influence on internal friction (admixtures, testing temperature, radiation, etc.) Orig. art. has: 5 figures.

ASSOCIATION: None

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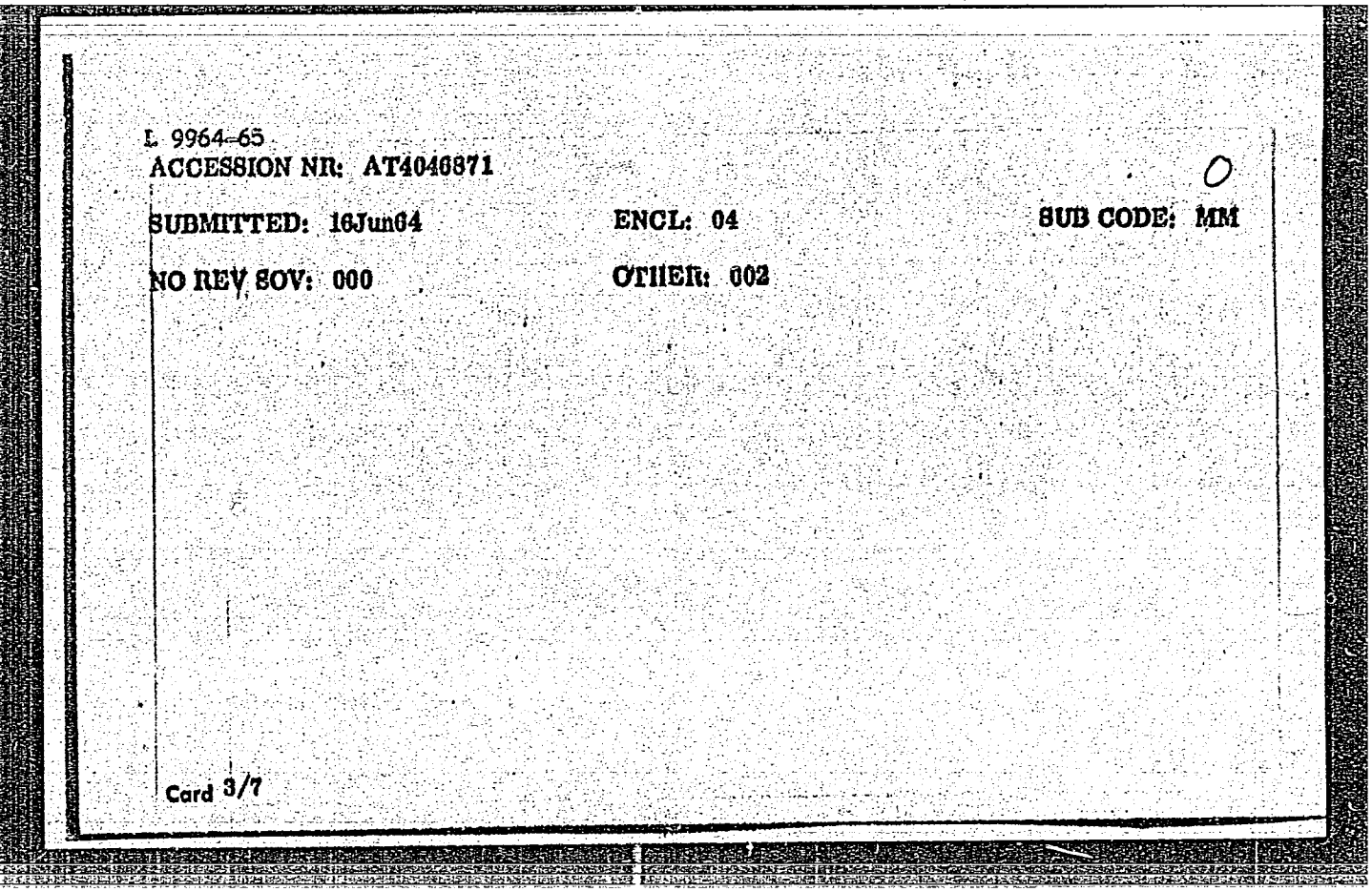

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ACCESSION NR: AT4046871 O

SUBMITTED: 16Jun64 ENCL: 04 SUB CODE: MM

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Card 3/7

L 9964-65
ACCESSION NR: AT4046871

ENCLOSURE: 01

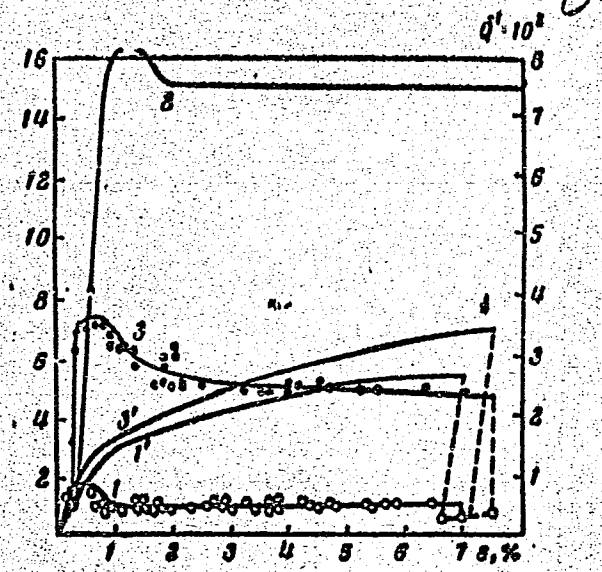

Fig. 1. Relationship between internal friction and amount of deformation (1-3) or the tensile stress (1', 3') for aluminum at room temperature:
1,1'- $\dot{\varepsilon}$ =0.00012 1/min; 2- $\dot{\varepsilon}$ =0.0018 1/min; 3,3'- $\dot{\varepsilon}$ =0.002 1/min

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L 9964-65
ACCESSION NR: AT4046871

ENCLOSURE: 02

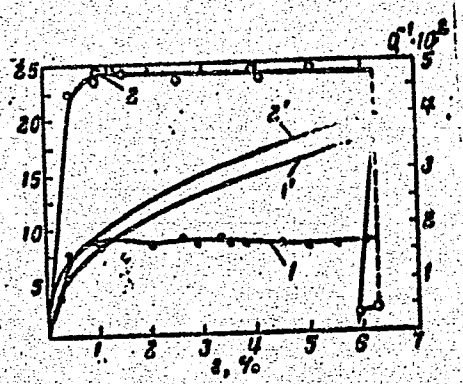

Fig. 2. Relationship between internal friction and amount of deformation (1,2) or the tensile stress (1', 2') for cooper: 1, 1'- =0.00012 1/min; 2, 2'- =0.0012 1/min

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L 9964-65
ACCESSION NR: AT4040871

ENCLOSURE: 03

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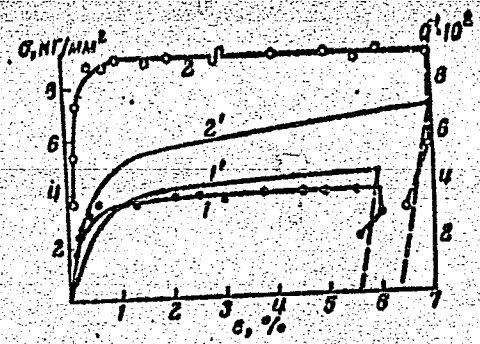

Fig. 3. Relationship between internal friction and amount of deformation (1,2) or the tensile stress (1', 2') for zinc:
1, 1' - $\dot{\varepsilon}$ = 0.00008 1/min; 2, 2' - $\dot{\varepsilon}$ = 0.0012 1/min

Card 6/7

L 9964-65
ACCESSION NR: AT4046871

ENCLOSURE: 04

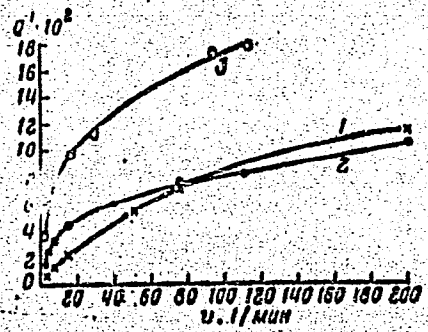

Fig. 4. Relationship between internal friction and deformation rate for an elongation of 3%:
1- aluminum; 2-cooper; 3-zinc

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ACCESSION NR: AR4041604 S/0137/64/000/005/I033/I034

SOURCE: Ref. zh. Metallurgiya, Abs. 5I207

AUTHOR: Postnikov, V. S.; Postnikov, V. S.

TITLE: Influence of different factors on the character of temperature dependence of internal friction of aluminum

CITED SOURCE: Sb. Relaksatsa. yavleniya v met. i splavakh. M., Metallurgizdat, 1963, 159-164

TOPIC TAGS: aluminum, internal friction, temperature dependence

TRANSLATION: Investigation was conducted with the help of torsion pendulum on wire samples of Al with 99.98% purity. Analysis of influence of different factors on the character of temperature dependence of internal friction shows that with decrease of diameter of sample from 5 to 1.5 mm the level of internal friction of metal is lowered, and peak of internal friction in region ~350° shifts to the side of lower temperatures. Up to temperatures ~150° the change of length of sample

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ACCESSION NR: AR4041604

from 200 to 50 mm (with constant diameter of 1 mm) does not affect the magnitude of internal friction. For sample with length of 20 - 30 mm in this region of temperatures there occurs sharp increase of internal friction and significant amplitude dependency of internal friction is observed. At temperatures >150° a noticeable decrease of level of internal friction with decrease of length of sample is observed. Up to temperature ~300° the weight of torsion system does not affect the magnitude of internal friction; however at higher temperatures increase of weight from 30 to 150 g leads to sharp growth of internal friction. Increase of frequency of oscillations of pendulum from 1 to 51 cycles per second leads to gradual lowering of peak of internal friction and displacement of it in the direction of higher temperatures. Presence of impurities in metal suppresses the grainborder peak of internal friction. Magnitude of peak and its position essentially depend on degree of preceding deformation. In case of polymorphous metal preliminary plastic flow sharply increases internal friction in region of transformation. Bibliography: 6 references.

SUB CODE: MM ENCL: 00

Card 2/2